

What is claimed:

1. A multi-point seat belt to increase survival chance for a passenger in the event of an accident of a transport system or turbulence-related vibrations of an aeroplane, comprising belt portions (1.1 to 1.4) and two belt ends (EL) and (ER), one belt end (EL) of which with  
5 the extending belt portion (1.4), loosely guided by a D-ring (12) and equipped with a belt retractor (13), having a clamping device, is arranged to a vehicle body, generally representing a post section of a motor vehicle, a body of the transport system or a floor (6) thereof;  
a main buckle assembly (9.1) having a master release button (84), adjacent to one side of a  
10 seat frame (3.3, 3.3a to 3.3d) and arranged to the floor (6);  
at least two latch plates (2, 9, 11, 25);  
a lower belt deflector (17) which, adjacent to the other side of the seat frame and arranged to the floor (6), deflects and loosely guides the first and lap belt portion (1.1, 1.3); and  
at least one upper buckle assembly (4, 4b, 4c, 4e, 14, 14a, 18, 18a, 18b, 18.1 to 18.3)  
15 arranged to a side (SR) of a seat backrest.

whereby

a lower part of his body (96) and an upper part (95) are restrained by the lap belt portion (1.3) and the second shoulder belt portion (1.2) when the main latch plate (9) is plug-in connected to the main buckle assembly (9.1); and

20 the upper part is restrained by the first and second shoulder belt portion, both (1.1, 1.2) extending crosswise in an X-shape when the shoulder latch plate (2), fastened to the other belt end (ER) of the first shoulder belt portion (1.1), is plug-in connected to the upper buckle assembly.

2. A multi-point seat belt to increase survival chance for a passenger in the event of an  
25 accident of a transport system or turbulence-related vibrations of an aeroplane, comprising belt portions (1.1 to 1.4) and two belt ends (EL) and (ER), one belt end (EL) of which with the extending belt portion (1.4), loosely guided by a D-ring (12) and equipped with a belt retractor (13), having a clamping device, is arranged in one side (SL) of a seat backrest (3.2, 3.2a to 3.2d) and the other belt end (ER) is arranged in the other side (SR) thereof;  
30 a main buckle assembly (9.1) having a master release button (84) and arranged to one side of a seat frame (3.3, 3.3a to 3.3d);

a lower belt deflector (17) which, arranged to the other side of the seat frame, deflects and loosely guides the first and lap belt portion (1.1, 1.3) and at least one latch plate (2, 9, 11, 25);

whereby

5 a lower part of his body (96) and an upper part (95) are restrained by the lap belt portion (1.3) and the second shoulder belt portion (1.2) when the main latch plate (9) is plug-in connected to the main buckle assembly (9.1); and  
the upper part is restrained by the first and second shoulder belt portion, both (1.1, 1.2) extending crosswise in an X-shape when the first shoulder belt portion (1.1) is moved from  
10 a resting position at the side (SL) to an operating position at the other side (SR).

3. A multi-point seat belt to increase survival chance for a passenger in the event of an accident of a transport system or turbulence-related vibrations of an aeroplane, comprising belt portions (1.1 to 1.4) and two belt ends (EL) and (ER), one belt end (EL) of which with the extending belt portion (1.4), loosely guided by an aperture of an upper portion of an  
15 upper belt deflector (5b), where the upper portion is located on a top edge of a seat backrest (3.2, 3.2a to 3.2d) at one side (SL) thereof, and equipped with a belt retractor (13), having a clamping device, is arranged in the side (SL) and the other belt end (ER) arranged in the other side (SR);  
a main buckle assembly (9.1) having a master release button (84) and arranged to one side of  
20 a seat frame (3.3, 3.3a to 3.3d);  
a lower belt deflector (17) which, adjacent to the other side of the seat frame and arranged to a floor (6), generally representing a floor of the transport system or a side rail of a motor vehicle, deflects and loosely guides the first and lap belt portion (1.1, 1.3) and at least one latch plate (2, 9, 11, 25);  
25 whereby  
a lower part of his body (96) and an upper part (95) are restrained by the lap belt portion (1.3) and the second shoulder belt portion (1.2) when the main latch plate (9) is plug-in connected to the main buckle assembly (9.1); and  
the upper part is restrained by the first and second shoulder belt portion, both (1.1, 1.2)  
30 extending crosswise in an X-shape when the first shoulder belt portion (1.1) is moved from a resting position at the side (SL) to an operating position at the side (SR).

4. A multi-point seat belt to increase survival chance for a passenger in the event of an accident of a transport system or turbulence-related vibrations of an aeroplane, comprising belt portions (1.1 to 1.4) and two belt ends (EL) and (ER), one belt end (EL) of which with the extending belt portion (1.4), loosely guided by a D-ring (12) and equipped with a belt retractor (13), having a clamping device, is arranged to a vehicle body, generally representing a post section of a motor vehicle, a body of the transport system or a floor (6) thereof, and the other belt end (ER) is arranged in one side (SR) of a seat backrest (3.2, 3.2a to 3.2d);

a main buckle assembly (9.1) having a master release button (84) and arranged to one side of a seat frame (3.3, 3.3a to 3.3d);

a lower belt deflector (17) which, arranged to the other side of the seat frame, deflects and loosely guides the first and lap belt portion (1.1, 1.3) and at least one latch plate (2, 9, 11, 25);

whereby

a lower part of his body (96) and an upper part (95) are restrained by the lap belt portion (1.3) and the second shoulder belt portion (1.2) when the main latch plate (9) is plug-in connected to the main buckle assembly (9.1); and

the upper part is restrained by the first and second shoulder belt portion, both (1.1, 1.2) extending crosswise in an X-shape when the first shoulder belt portion (1.1) is moved from a resting position at the other side (SL) of the seat backrest to an operating position at the side (SR).

5. The multi-point seat belt to protect the passenger from submarining according to claim 1, further comprising an anti-submarining latch plate (11, 25) movable along the lap belt portion (1.3)

which is subdivided into two belt portions (1.3R, 1.3L) to restrain thighs of the passenger when the anti-submarining latch plate is plug-in connected to one of anti-submarining buckle assemblies (7, 8, 8a) which, arranged in a seat cushion (3.1, 3.1a to 3.1d), have a mutual release button (84o) on the seat.

6. The multi-point seat belt according to claim 1, further comprising a height- and width-adjusting mechanism (27) consisting of

a pair of tubes (27.1) of a seat backrest frame (3.4d) having a plurality of vertical locking slots, one pair of which is engaged with a locking handle (27.5), that can be pulled to

detach therefrom and released to engage, when a height of a body proportion of the passenger is adjusted;

a frame (29) consisting of a pair of outer frame-tubes (27.2), movable along the inner frame-tubes (27.1), a connecting member of all frame-tubes (27.2, 27.3) and a pair of outer tubes (27.3), in which inner tubes (27.4) are movable, biased by springs (27.6) and form- and force-locking connected to the locking handle (27.5), where the spring (27.6) on a sleeve (27.7), secured by a pin (27.8), protruding through holes of the inner tube (27.4), presses against a spring rest (27.9) of the outer tube (27.3);

a plurality of horizontal locking slots arranged along one of the outer tubes (27.3); and

at least one buckle assembly (18.3, 19.3), consisting of a buckle assembly (4c), to connect to the latch plate, and a housing (18.12), form-locking connected to the buckle assembly, movable along the outer tubes (27.3) and secured by a pawl (18.10) biased by a spring (18.5), engaged with the horizontal locking slot (r) and detached therefrom by pulling the pawl to adjust to a width of his body proportion.

7. The multi-point seat belt according to claim 5, wherein the master release button (84) is provided with release cables (4.2) connecting to release buttons of the buckle assemblies where the master release button, when depressed, releases all the latch plates from the respective buckle assemblies.

8. The multi-point seat belt according to claim 7, wherein the lower belt deflector (17) comprises a housing, having an attachment hole, and a pin (17.1), attached in the housing to form an aperture which loosely retains the shoulder latch plate (2) when released.

9. The multi-point seat belt according to claim 8, wherein the pin (17.1) is surrounded by a sleeve (17.2).

10. The multi-point seat belt according to claim 9, wherein the lower belt deflector (17) is made of one piece.

11. The multi-point seat belt according to claim 8, wherein the passenger, intending to use the multi-point seat belt, easily accesses the released shoulder latch plate when being plug-in connected to an assisting buckle assembly (16, 16a, 16b) which, having an easily-accessible release button, is arranged to the seat.

12. The multi-point seat belt according to claim 8, wherein the passenger, intending to use the multi-point seat belt, easily accesses the released shoulder latch plate when being plug-in

connected to an assisting buckle assembly (16, 16a, 16b) which, having an easily-accessible release button, is arranged to the post section.

13. The multi-point seat belt according to claim 1, further comprising a belt-feeding device (20a, 20b) consisting of

5 a belt housing (20.4a) equipped with the shoulder latch plate (2) of the first shoulder belt portion (1.1); and

an operating arm (20.2a), to one end of which is connected the belt housing and the other end is connected to a guide tube (20.1) pivotally attached in the seat backrest;

whereby the shoulder latch plate (2) is inserted into and connected to the upper buckle

10 assembly (4, 14, 18) and the first shoulder belt portion is moved from a resting position to an operating position by rotatory movement of the operating arm.

14. The multi-point seat belt according to claim 5, further comprising a belt-feeding device (20a, 20b) consisting of

15 a belt housing (20.4a) equipped with the shoulder latch plate (2) of the first shoulder belt portion (1.1);

an operating arm (20.2a), to one end of which is connected the belt housing and the other end is connected to a guide tube (20.1) pivotally attached in a supporting tube (3.61) of a head rest (3.6a); and

at least one drive apparatus to rotate the operating arm with the belt housing;

20 whereby the shoulder latch plate (2) is inserted into and connected to the upper buckle assembly (4, 14, 18) and the first shoulder belt portion is moved from the resting position to the operating position by rotatory movement of the operating arm when the drive apparatus is activated.

15. The multi-point seat belt according to claim 14, wherein the drive apparatus returns the 25 first shoulder belt portion (1.1) from the operating position to the resting position, when a dwell time, predetermined for insertion of the shoulder latch plate (2) into the upper buckle assembly (4, 4a to 4c, 14, 14a, 18), is exceeded.

16. The multi-point seat belt according to claim 14, wherein the operating arm (20.2a) and the belt housing have a vertical portion and a vertical tube, which, having two openings, facing 30 each other, is movable along the vertical portion to adjust the height of the belt housing.

17. The multi-point seat belt according to claim 14, wherein the operating arm (20.2a) is a radial-adjustable tube (20.3) where the first shoulder belt portion is moved from the resting position to the operating position by radial-adjusting movement of the radial-adjustable tube when the drive apparatus is activated.

5 18. The multi-point seat belt according to claim 14, wherein the master release button (84) is provided with release wires connected to electrical release-motors (4.2b) of release buttons of the buckle assemblies and a release wire connected to the drive apparatus where the master release button, when depressed, releases all the latch plates from the respective buckle assemblies and returns the belt-feeding device to the resting position.

10 19. The multi-point seat belt according to claim 1, wherein the multi-point seat belt (1, 1a to 1d) consists of a three-point seat belt (1e) and an additional shoulder belt (1.12), to the end of which a transition buckle assembly (4e) is attached and the other end is provided with the shoulder latch plate (2a), which is plug-in connected to the upper buckle assembly;

15 where

a transition latch plate (2) is arranged to the end of a lower shoulder belt portion (1.11) of the three-point seat belt (1e) and

the passenger is restrained by plug-in connection of the main latch plate (9) with the main buckle assembly (9.1) and of the transition latch plate (2) with the transition buckle

20 assembly (4e), where the lower shoulder belt portion (1.11) projects through the lower belt deflector (17) at a sufficient length ( $l_1$ ) needed for the belt retractor to retract the first shoulder belt portion, defined by the lower shoulder belt portion and the additional shoulder belt, in a real-world accident.

25 20. The multi-point seat belt according to claim 2, wherein the multi-point seat belt (1, 1a to 1d) consists of a three-point seat belt (1e) and an additional shoulder belt (1.12), to the end of which a transition buckle assembly (4e) is attached and the other end is arranged in the side (SR) of the seat backrest;

where

30 a transition latch plate (2) is arranged to the end of a lower shoulder belt portion (1.11) of the three-point seat belt (1e) and

the passenger is restrained by plug-in connection of the main latch plate (9) with the main buckle assembly (9.1) and of the transition latch plate (2) with the transition buckle

assembly (4e), where the lower shoulder belt portion (1.11) projects through the lower belt deflector (17) at a sufficient length ( $l_1$ ) needed for the belt retractor to retract the first shoulder belt portion, defined by the lower shoulder belt portion and the additional shoulder belt, in a real-world accident.

5      21. The multi-point seat belt according to claim 20, wherein the other end of the additional shoulder belt (1.12) is provided with a second belt retractor (13a), which, arranged in the side (SR) of the seat backrest (3.2), has a spring force, which is less than of the belt retractor (13).

22. The multi-point seat belt according to claim 2, further comprising a belt-feeding device (20, 20c, 20d) consisting of

10      a pair of rollover tubes (20.2b) inserted into a pair of angle fittings (26a) of a seat backrest frame (3.4d);

a belt housing (20.4d), in which, movable along the pair of rollover tubes and guided thereby, the first shoulder belt portion is located; and

a drive apparatus, movable along a threaded spindle (20.1a), fastened to the pair of angle fittings (26a), to translatory move the belt housing;

15      whereby the first shoulder belt portion is moved from the resting position to the operating position by translatory movement of the belt housing when the drive apparatus is activated.

23. The multi-point seat belt according to claim 22, wherein the a belt-feeding device is provided with an operating arm (20.2),

20      to one end of which a belt ring (20.8) is rigidly attached to receive and loosely guide the first shoulder belt portion and

the other end is connected to a guide tube (20.1), pivotally attached to a bearing casing (20.10) of the seat backrest frame are rotated by a second drive apparatus;

25      where the first shoulder belt portion is moved from the resting position to the operating position by translatory movement of the belt housing and rotatory movement of the operating arm when both drive apparatus are activated.

24. The multi-point seat belt according to claim 23, wherein the translatory movement of the belt housing and the rotatory movement of the operating arm are synchronised.

30      25. The multi-point seat belt according to protect the passenger in a rollover-accident to claim 24, wherein the belt-feeding device (20c, 20d) serves as a protective-rollover device

having the pair of rollover tubes (20.2b), along which the belt housing (20.4d), having holes to receive a pair of legs of a safety bracket (20.6), is moved in the operating position, the holes of the belt housing and holes of one of the rollover tubes (20.2b) are aligned with each other and

5 in excess of a threshold value in the rollover-accident the pair of legs of the safety bracket protrudes through all the holes, block the translatory movement of the belt housing and clamp the first shoulder belt portion.

26. The multi-point seat belt according to claim 24, wherein the belt end (ER) of the first shoulder belt portion (1.1) is provided with a coupling fitting (1.2a, 1.2b) to receive energy  
10 absorbers.

27. The multi-point seat belt according to claim 24, wherein the belt retractor (13), attached to oblong holes of a stiff plate (13.3) of the seat backrest frame, is provided with a coupling fitting (1.2a, 1.2b) to receive energy absorbers, where in excess of threshold value the belt retractor are moveable along oblong holes and guided thereby.

15 28. The multi-point seat belt according to claim 3, wherein the upper belt deflector is height-adjustable and provided with a handle by movement of which a height thereof is adapted to a body proportion of the passenger.

29. The multi-point seat belt according to claim 3, wherein a lower portion of the non-height-adjustable upper belt deflector in the seat backrest is provided with a coupling fitting  
20 (1.2a, 1.2b) to receive energy absorbers.

30. The multi-point seat belt according to claim 4, wherein an upper belt deflector (5a), having an aperture to loosely guide the second shoulder belt portion, is attached to a height-adjustable head rest (3.6a) where an adaptation of a height thereof to a head of the passenger results in a self-adaptation of both shoulder belt portions, extending crosswise over the upper  
25 part of his body in the X-shape, to his body proportion.

31. The multi-point seat belt according to claim 4, further comprising a belt-feeding device (20), belt-feeding members of which in the resting or operating position are countersunk in the seat backrest, where the belt-feeding device consists of

an operating arm (20.2), to one end of which a belt ring (20.8), having a key, is rigidly  
30 attached to house and loosely guide the first shoulder belt portion (1.1) and to the other end a guide tube (20.1) is rigidly attached;



the guide tube (20.1), which, pivotally attached to a bearing casing (20.10) of a seat backrest frame, is rotated from the resting position to the operating position by at least one drive apparatus, when activated; and

a belt-feeding plate (20.9, 20.9a), which, located on a top edge of the seat backrest at the side (SR) thereof, has a receptacle through which the key projects in the operating position;

whereby the drive apparatus, being activated,

moves up over a head rest the belt-feeding plate and the guide tube with the operating arm and the first shoulder belt portion;

rotates the operating arm and the first shoulder belt portion over the head rest, a head of the passenger and in front of the upper part of his body until the key engages with the receptacle in a contact position and

countersinks the belt-feeding plate and the guide tube with the operating arm in the seat backrest until reaching the operating position in which the first shoulder belt portion

extends across over the upper part of the body and the drive apparatus is switched off.

**32.** The multi-point seat belt according to claim 31, wherein the drive apparatus, activated in response to actuating a switch, is switched off when the operating position is reached.

**33.** The multi-point seat belt according to claim 31, wherein the drive apparatus, activated in response to activating a switch, attached in the main buckle assembly (9.1), upon contact with a cam of the main latch plate (9), when inserted therein, is switched off when the operating position is reached.

**34.** The multi-point seat belt according to claim 31, wherein the drive apparatus, activated in response to starting an engine, is switched off when the operating position is reached.

**35.** The multi-point seat belt according to claim 31, wherein the drive apparatus, activated in response to closing a vehicle door, is switched off when the operating position is reached.

**36.** The multi-point seat belt according to claim 31, wherein the drive apparatus is activated when the passenger takes his seat, whereto a pressure sensor is built, where the drive apparatus is switched off when the operating position is reached.

**37.** The multi-point seat belt according to claim 31, wherein the drive apparatus is operable to return the first shoulder belt portion (1.1) from the operating position to the resting

position, when a dwell time, predetermined for engagement of the key with the receptacle, is exceeded.

38. The multi-point seat belt according to claim 31, wherein the drive apparatus, activated in response to depressing x-times the master release button (84), is switched off when the  
5 operating position is reached.

39. The multi-point seat belt to protect the passenger from submarining according to claim 31, wherein an anti-submarining latch plate (11, 25) is movable along the lap belt portion (1.3) which is subdivided into two belt portions (1.3R, 1.3L) to restrain thighs of the passenger when the anti-submarining latch plate is plug-in connected to one of anti-submarining buckle  
10 assemblies (8b, 8c) each of which is provided with a release button (84e) and a length-adjustable belt and attached to a seat cushion.

40. The multi-point seat belt to protect the passenger from submarining according to claim 31, wherein an anti-submarining latch plate (11, 25) is movable along the lap belt portion (1.3) which is subdivided into two belt portions (1.3R, 1.3L) to restrain thighs of the passenger  
15 when the anti-submarining latch plate is plug-in connected to one of anti-submarining buckle assemblies (7, 8, 8a) which, arranged in a seat cushion (3.1, 3.1a to 3.1d), have a mutual release button (84o) on the seat.

41. The multi-point seat belt according to claim 40, wherein the master release button (84) is provided with release cables (4.2) connecting to release buttons of the anti-submarining buckle  
20 assemblies and a release wire connected to the drive apparatus where the master release button, when depressed, releases the main latch plate and the anti-submarining latch plate from the respective buckle assemblies and returns the belt-feeding device to the resting position.

42. The multi-point seat belt according to claim 40, wherein a belt-catching member (20.7, 20.7a) is attached to the seat backrest to intercept and hold the first shoulder belt portion  
25 (1.1) when being in the resting position.

43. The multi-point seat belt according to claim 1, wherein the belt-detachable latch plate (25) has a quick-release pin (25.1) and a U-shaped portion to house the belt portion which is secured therein by the quick-release pin and detached therefrom by pulling it.